



Private Sector Disemployment Effects of a New Low Carbon Fuel Standard in Washington State

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Executive Summary

Washington State Governor Jay Inslee recently broached the idea of signing an executive order that would impose lower carbon fuel standards on the state of Washington. A lower carbon fuel standard requires a reduction in the carbon intensity of the transportation fuel mix, on average, over time, considering the entire lifecycle of the fuels. According to a recent report issued by the Washington State Climate Legislative and Executive Workgroup, the implementation of a lower carbon fuel standard involving a ten percent reduction in the carbon intensity of fuel mix over a ten-year time period in the State of Washington would increase the cost of transportation fuel by \$103 per metric ton of carbon dioxide equivalents (mtCO₂e) to \$131 per mtCO₂e. Using conversion rates provided by the U.S. Environmental Protection Agency, this range of cost increases is equivalent to an increase in the per-gallon cost of gasoline of \$0.90 per gallon to \$1.16 per gallon. **Using the REMI PI+ model, a leading large-scale econometric forecasting model, the NFIB Research Foundation estimates that such increases in the cost of energy due to a lower carbon fuel standard could lead to the loss of over 11,000 Washington State jobs during a five-year period.**

Introduction

Taxes on gasoline in the United States have been in place since the early twentieth century. In 1919, the state of Oregon became the first state to tax motor fuels. By 1932, every state in the union as well as the District of Columbia had a tax on gasoline. The year 1932 also witnessed the introduction of a federal gasoline tax.¹ Initially, the federal gasoline tax took the form of a temporary one-cent-per-gallon tax. Scheduled to expire in 1934, the federal gas tax was not originally intended to fund building or maintaining roads, but rather to help reduce the deficit in the midst of the Great Depression. Not unusually, what was originally proposed as a temporary tax became a permanent one, with the federal gasoline tax gradually rising over the years to its present rate of 18.4 cents per gallon, various portions of which go to fund the interstate highway system, reduce the deficit, and help pay for mass transit projects.

Recently, Washington State Governor Jay Inslee broached the idea of signing an executive order that would impose lower carbon fuel standards on the state of Washington. A lower carbon fuel standard (LCFS) requires a reduction in the carbon intensity of the transportation fuel mix, on average, over time, considering the entire lifecycle of the fuels.² The lifecycle of petroleum-based fuels includes the greenhouse gas emissions associated with crude recovery, crude transportation, fuel production, fuel transportation, and end-use of the fuel in motor vehicles.³ A LCFS is just one of numerous approaches considered recently to reduce greenhouse gas emissions in Washington State. Other policy options considered include a cap and trade system, a carbon tax, a zero emissions vehicle goal, and renewable fuels standards, among others. A recent report issued by the Washington State Climate Legislative and Executive Workgroup (CLEW) evaluated these approaches to reduce greenhouse gas emissions intended to achieve the State's emission targets set in statute RCW 70.235.020. The CLEW was created under Engrossed Second Substitute Senate Bill 5802 during the 2013 Regular Session, and its members consist of Governor Inslee, Senators Doug Ericksen (R) and Kevin Ranker (D), and Representatives Joe Fitzgibbon (D) and Shelly Short (R).

According to the CLEW's final report issued in October 2013, the implementation of a LCFS involving a ten percent reduction in the carbon intensity of fuel mix over a ten-year time period in the State of Washington would increase the cost of transportation fuel by \$103 per metric ton of carbon dioxide equivalents (mtCO_{2e}) to \$131 per mtCO_{2e}. This range of cost

¹ Bickley, James M., "The Federal Excise Tax on Gasoline and the Highway Trust Fund: A Short History," Congressional Research Service, September 2012.

² According to the National Renewable Energy Laboratory (NREL), "A lifecycle assessment is a standardized technique that tracks all material, energy, and pollutant flows of a system—from raw material extraction, manufacturing, transport, and construction to operation and end-of-life disposal. Life cycle assessment can help determine environmental burdens from 'cradle to grave' and facilitate comparisons of energy technologies." NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC. For more information on life cycles of energy technologies, see http://www.nrel.gov/analysis/sustain_lca_about.html.

³ "Evaluation of Approaches to Reduce Greenhouse Gas Emissions in Washington State – Final Report," prepared for State of Washington Climate Legislative and Executive Workgroup (CLEW) by *leidos*, October 2013.

increases is equivalent to an increase in the per-gallon cost of transportation fuel of \$0.90 per gallon to \$1.16 per gallon.⁴ The entities typically regulated by a LCFS are fuel producers and importers who sell motor gasoline and diesel fuel. The increase in transportation costs referenced above can be expected to apply to motor gasoline. Given that its implementation will effectively increase the cost of motor gasoline, the LCFS is economically equivalent to a gasoline tax.⁵

Imposing taxes of this magnitude on gasoline consumption in Washington State would easily make Washington the state with the highest gasoline tax in the nation. According to the Tax Foundation, Washington currently has the ninth highest gasoline tax rate in the nation at \$0.375 per gallon (**Figure 1**). Unlike most other states, 100 percent of Washington's gasoline tax is an excise tax intended to curb the usage of motor gasoline. Other states have gasoline taxes with portions of those taxes imposed to cover inspection fees, pay for leaking underground storage tanks, and as additional sales taxes (among other reasons). The existing \$0.375 per gallon gasoline tax referenced above does not include the \$0.184 per gallon *federal* tax on gasoline. The combined federal and state tax on gasoline in Washington is \$0.559 per gallon.

Increasing the price of gasoline by \$0.90 per gallon to \$1.16 per gallon will clearly have an impact on the finances of gasoline consumers. Such increases are equivalent to raising the price of gasoline in Washington from anywhere between 24.5 percent and 31.6 percent. According to 2013 data from the Bureau of Economic Analysis's NIPA accounts, consumption of motor vehicle fuels, lubricants, and fluids totaled \$381.8 billion and accounted for 14.7 percent of all nondurable goods consumption, 9.9 percent of all goods consumption, and 3.3 percent of total personal consumption expenditures, considerable amounts of Americans' yearly expenditures. The importance of energy prices to small business owners in particular is underlined by the fact that small business owners listed the "cost of natural gas, propane, gasoline, diesel, [and] fuel oil" as the third most important problem they faced in a recent survey conducted by the NFIB Research Foundation.⁶

To estimate the impact that additional gas taxes might have on private sector employment in Washington, the NFIB Research Foundation employed PI+, a leading dynamic, multi-region model based on the Regional Economic Models, Inc. (REMI) structural economic forecasting and policy analysis model which integrates input-output, computable general equilibrium,

⁴ According to the Environmental Protection Agency, 8.887×10^{-3} metric tons of CO₂ are equivalent to one gallon of gasoline. Taking the inverse, one metric ton of CO₂ is equivalent to approximately 112.5239 gallons of gasoline. Dividing the estimated cost increases in per mtCO₂e terms due to an LCFS by the gasoline-to-mtCO₂ ratio gives the range of $(\$103/112.5239) \approx \0.90 per gallon to $(\$131/112.5239) \approx \1.16 per gallon. See "Clean Energy: Calculations and References," United States Environmental Protection Agency, <http://www.epa.gov/cleanenergy/energy-resource/refs.html>.

⁵ The terms "motor gasoline" and "gasoline" are used interchangeably in the text throughout this report. In the REMI PI+ model, the assumed price increases were applied to the policy variable "motor vehicle fuels, lubricants, and fluids."

⁶ Wade, Holly, "Small Business Problems and Priorities," NFIB Research Foundation, August 2012.

econometric, and economic geography methodologies.⁷ By comparing simulation results for scenarios which include proposed or yet-to-be-implemented policy changes with the model's baseline forecast, PI+ is able to obtain estimates of how these policy changes might impact businesses and their workers. For this analysis, estimates of private sector employment effects in Washington were extrapolated from estimates of national employment effects due to nationwide gas taxes of equal (per gallon) dollar amounts.

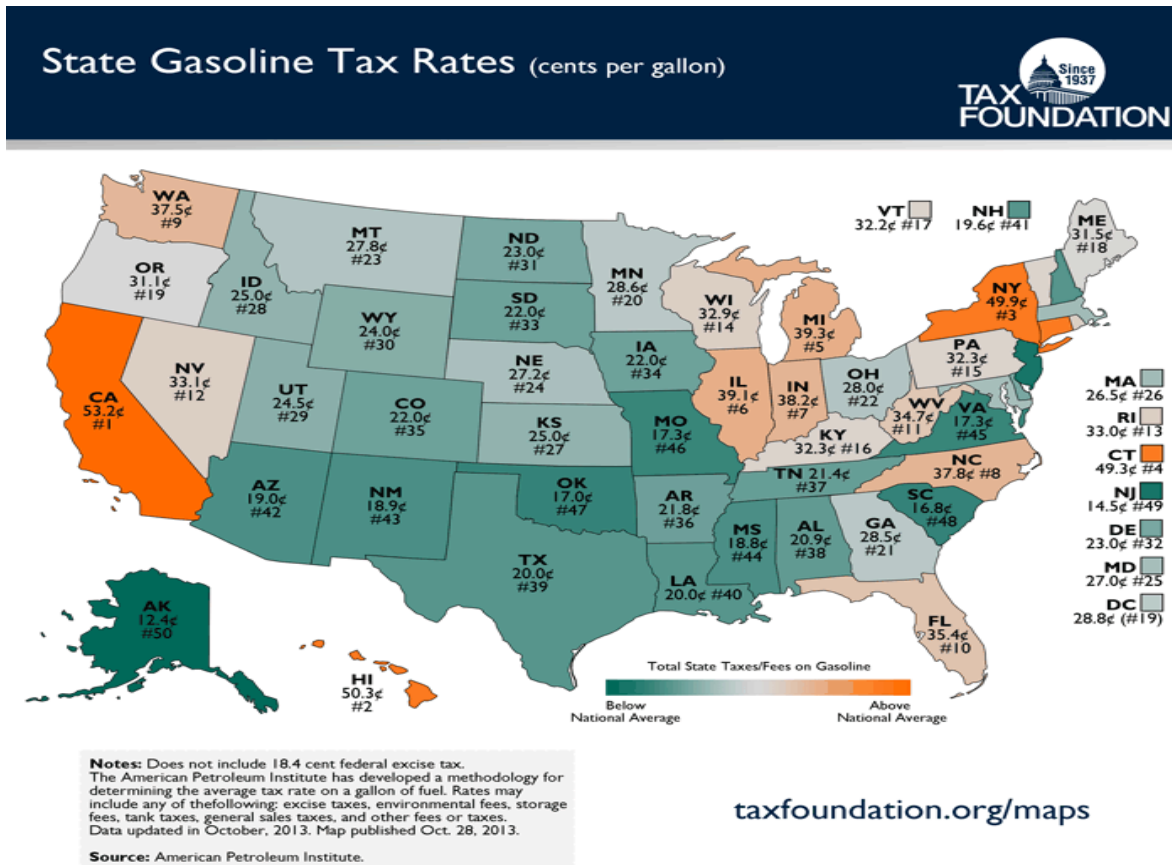


Figure 1⁸

Trends in Gasoline Sales, Consumption, and Prices in Washington

Data from the U.S. Energy Information Administration indicate that since late 1994, gasoline sales and deliveries in Washington have generally stayed within the range of seven million gallons per day to eight million gallons per day. **Figure 2** shows the trend in prime supplier⁹ sales and deliveries of gasoline for Washington from 1983 to the present. The red line exhibiting higher volatility is the non-seasonally-adjusted data series. The blue line is the seasonally

⁷ The REMI model is used by a diverse group of clients spanning academia, private consulting firms, local and regional governments, and nonprofits, to name a few categories. A sample of clients includes the Massachusetts Institute of Technology, the AARP, the Urban Institute, and the Florida legislature.

⁸ Figure courtesy of the Tax Foundation. Data used is originally provided by the American Petroleum Institute.

⁹ A prime supplier is a firm that produces, imports, or transports selected petroleum products across state boundaries and local marketing areas and sells the products to local distributors, local retailers, or end users.

adjusted data series using the Census Bureau’s X12 seasonal adjustment algorithm. From 1983 to late 1994, prime supplier sales and deliveries for Washington grew from roughly five million gallons per day to approximately seven million gallons per day. In recent years, gasoline sales and deliveries have exhibited very little trend movement by historical standards. Seasonally adjusted sales and deliveries in Washington over the past five years average 7.4 million gallons per day.

The relatively stable level of gasoline sales and deliveries for Washington is mirrored by the apparent plateauing of gasoline consumption within Washington. Total annual consumption of motor gasoline in Washington (**Figure 3**) has grown considerably since collection of gasoline consumption data first began, nearly tripling in magnitude from 23.1 million barrels in 1960 to 65.7 million barrels in 2006—just prior to the financial crisis and Great Recession—before receding to 62.9 million barrels in 2012. Since 1996, total annual statewide consumption of gasoline has ranged from 61.6 million barrels to 65.9 million barrels. Total gasoline consumption has generally fallen year-over-year since the 2007/8 financial crisis, although the annual changes in consumption levels are minor compared to historical standards. Readers will note that the sales and deliveries of gasoline exceed the state’s consumption levels. The difference between the two figures is due to the fact that Washington is the primary crude oil refining center for the Pacific Northwest with power generation exceeding the state’s needs.¹⁰

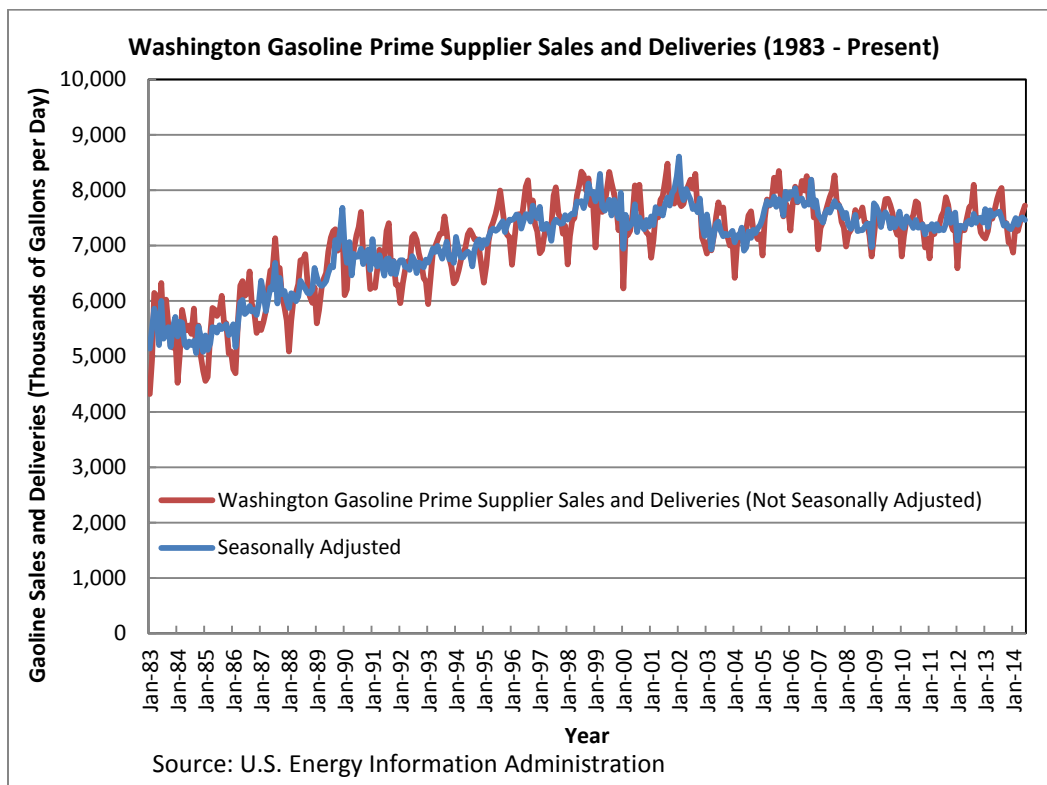


Figure 2

¹⁰ “Washington State Energy Profile,” U.S. Energy Information Administration, last updated July 2014.

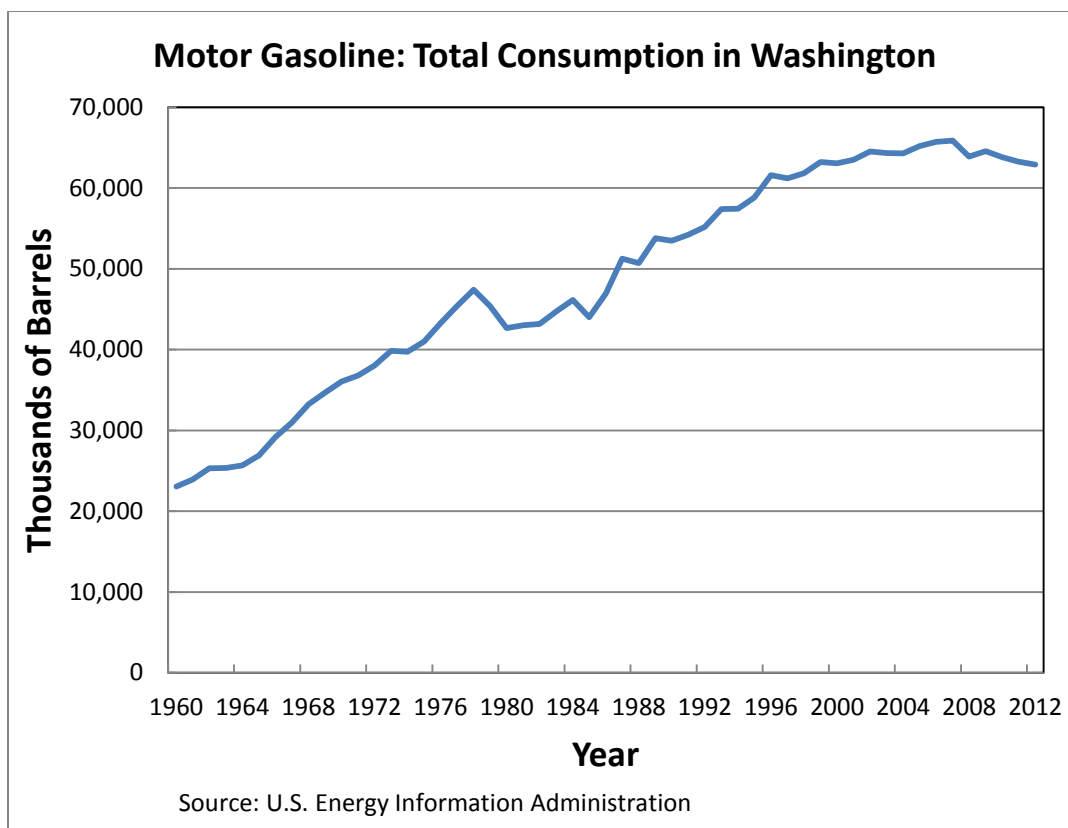


Figure 3

All five refineries in Washington produce motor gasoline, which accounts for nearly half of all consumption of petroleum products in the state. The latest data from the Energy Information Administration estimates total consumption of petroleum products in Washington at 139.2 million barrels in 2012 (**Table 1**). 2012 motor gasoline consumption in Washington is estimated at 62.9 million barrels. The share of total motor gasoline in the United States consumed by energy users in Washington is 2.0 percent (**Table 2**), very similar to the share of total petroleum products in the United States consumed by energy users in Washington (2.1 percent).

Table 1: Total End-Use Energy Consumption Estimates, 2012

State	Coal Million Short Tons	Natural Gas Billion Cubic Feet	Petroleum						Nuclear Electric Power Billion Kilowatt Hours	Hyrdoelectric Power Billion Kilowatt Hours	Ethanol Milion Barrels
			Distillate Fuel Oil	Jet Fuel	JPG	Motor Gasoline	Residual Fuel Oil	Other			
			Million Barrels								
Alabama	25.7	671.3	27.2	2.2	2.9	60.8	1.8	7.6	40.8	7.4	4.4
Alaska	1	343.1	13.8	20	0.3	6.8	0.4	4	0	1.6	0.8
Arizona	21.9	332.1	25.3	3.8	1.7	61.7	0	3.2	31.9	6.7	8.2

Arkansas	17.2	295.8	21.2	1	2.1	33.5	(s)	3.2	15.5	2.2	3
California	1.9	2,403.40	89.8	94.5	15.5	343.1	26.6	50.8	18.5	26.8	28.9
Colorado	19.5	443.4	19.1	10.6	5.8	49.9	0	4.5	0	1.5	3.7
Connecticut	0.4	229.2	18.3	1.7	3	34.2	0.2	1.2	17.1	0.3	3.8
Delaware	0.7	101.7	2.2	0.1	1.1	10.1	0.4	4.9	0	0	1
Dist. of Col.	(s)	28.6	0.7	0	(s)	2.3	0	0.1	0	0	0.2
Florida	20.4	1,328.50	46.1	33.2	4.6	192.3	11.9	6.7	17.9	0.2	18.8
Georgia	21.7	615.8	35.7	11.3	5.5	110.8	6.4	6.5	33.9	2.2	11.3
Hawaii	0.8	2.7	6.1	11.3	0.9	10.5	10.7	2.8	0	0.1	1.3
Idaho	0.3	89	9.6	0.7	1.4	16.5	(s)	1.6	0	10.9	1.3
Illinois	53.4	938.1	43.7	24.7	19.2	109.8	(s)	28.5	96.4	0.1	11.7
Indiana	54.6	650.2	38.2	8.5	5.5	70.6	0.2	15	0	0.4	7.2
Iowa	24.3	295.2	23.9	1.1	14.9	38.6	(s)	2.4	4.3	0.8	2.4
Kansas	17.8	262.2	18.7	2.8	18	29.4	0.2	9.2	8.3	(s)	2.8
Kentucky	40.1	224.6	28.7	9	9	50.7	(s)	16.3	0	2.4	4.9
Louisiana	14.9	1,552.80	35.8	19.1	64.7	52.6	14.3	142.6	15.7	0.7	5.3
Maine	0.1	68.3	11.6	1.2	2.8	15.5	1.3	0.6	0	3.7	1.8
Maryland	7.9	208.9	18	2.1	2.6	64.1	0.3	3.7	13.6	1.7	5.7
Massachusetts	1	416.3	25.7	6.7	2.7	65.7	0.6	1.8	5.9	0.9	6.6
Michigan	32	790.1	25.7	3.6	9.4	105.4	0.5	10.3	28	1.2	10.8
Minnesota	14.5	419.5	26.6	9	7.5	60.3	0.1	12.6	11.9	0.6	5.9
Mississippi	5.4	474.2	20	6.8	2.5	38.8	1.1	9.5	7.3	0	3.5
Missouri	43.4	255.9	29.7	3.4	7.4	72.7	(s)	7.4	10.7	0.7	5.2
Montana	9.3	73.4	10	0.9	2.2	11.9	(s)	6.2	0	11.3	1.2
Nebraska	15.9	158.8	19.8	0.9	2.6	19.9	(s)	1.1	5.8	1.3	1.5
Nevada	2.6	273.5	8.8	4.5	1.1	25.6	0	1.1	0	2.4	2.7
New Hampshire	0.5	72.1	5.8	0.4	4	16.5	0.3	0.6	8.2	1.3	1.4
New Jersey	1	652.1	28.4	31.6	1.9	95.9	6.7	19.1	33.1	(s)	10.9
New Mexico	14.5	244.6	14.6	1.2	6.9	22.7	0	4	0	0.2	1.7
New York	3.1	1,223.10	61	25.8	7	128.3	10.3	9.4	40.8	24.7	14.1
North Carolina	21.7	363.9	28.8	3.9	9.8	100.8	0.5	5.5	39.4	3.7	10.6
North Dakota	29.4	72.7	20.8	1	2.4	10.3	(s)	2.4	0	2.5	0.9
Ohio	42.2	843	50	12.7	6.7	116.5	0.2	28	17.1	0.4	12.1
Oklahoma	18.9	692	30.7	6.9	2.4	45.4	0.6	13.1	0	1.1	3.7
Oregon	1.7	215.8	18.8	4.5	1.5	34.7	0.9	3	0	39.4	4.2

Pennsylvania	48.6	1,038.00	61.9	8.2	13.3	118.4	1.5	20.5	75.2	2.2	9.5
Rhode Island	0	95.5	4.8	0.7	0.4	8.6	(s)	0.3	0	(s)	1.3
South Carolina	12.2	244.8	18.3	1.5	2.2	62.3	2.5	5.2	51.1	1.4	6.3
South Dakota	2.2	70.2	8	0.9	1.7	10.8	(s)	1.1	0	6	0.9
Tennessee	20	277.3	28.2	11.5	2.4	74.1	0.1	11	25.1	8.3	7.6
Texas	98.3	3,890.80	160.6	62.4	522	293.8	21.3	220.4	38.4	0.6	27.9
Utah	14.7	223	14.8	5.6	1.2	25	(s)	5	0	0.7	2
Vermont	0	8.2	4.2	0.2	2.4	7.5	0.1	0.2	5	1.1	0.9
Virginia	9	410.1	32.7	16.9	4.8	92.9	2.2	3.8	28.7	1	9.5
Washington	2.6	264.3	23.6	19.4	4.3	62.9	10.1	18.9	9.3	89.5	7.8
West Virginia	31.5	129.6	12.8	0.2	1.1	19.1	0.2	1.7	0	1.4	1.8
Wisconsin	20.7	402.7	24.3	1.5	7.3	58.6	0.1	6.8	14.3	1.5	5.3
Wyoming	27.9	153.4	16	0.4	1.3	8.5	(s)	4.5	0	0.9	0.6
United States	889.2	25,533.40	1,369.40	511.7	824	3,177.70	135	749.8	769.3	276.2	306.7

Source: U.S. Energy Information Administration

Table 2: Percent Share of National Motor Gasoline and Petroleum Products Consumption in 2012, by State

State	Motor Gasoline (Millions of Barrels)	All Petroleum Products (Millions of Barrels)	Percent Share of National Gasoline Consumption	Percent Share of Petroleum Products Consumption
Alabama	60.8	102.5	1.91%	1.51%
Alaska	6.8	45.3	0.21%	0.67%
Arizona	61.7	95.6	1.94%	1.41%
Arkansas	33.5	61	1.05%	0.90%
California	343.1	620.2	10.80%	9.16%
Colorado	49.9	90	1.57%	1.33%
Connecticut	34.2	58.7	1.08%	0.87%
Delaware	10.1	18.9	0.32%	0.28%
Dist. of Col.	2.3	3.1	0.07%	0.05%
Florida	192.3	294.8	6.05%	4.36%
Georgia	110.8	176.2	3.49%	2.60%
Hawaii	10.5	42.4	0.33%	0.63%
Idaho	16.5	29.8	0.52%	0.44%
Illinois	109.8	225.9	3.46%	3.34%
Indiana	70.6	138.1	2.22%	2.04%
Iowa	38.6	81	1.21%	1.20%
Kansas	29.4	78.3	0.93%	1.16%
Kentucky	50.7	113.8	1.60%	1.68%

Louisiana	52.6	329.1	1.66%	4.86%
Maine	15.5	32.9	0.49%	0.49%
Maryland	64.1	90.8	2.02%	1.34%
Massachusetts	65.7	103.1	2.07%	1.52%
Michigan	105.4	154.9	3.32%	2.29%
Minnesota	60.3	116.1	1.90%	1.72%
Mississippi	38.8	78.6	1.22%	1.16%
Missouri	72.7	120.6	2.29%	1.78%
Montana	11.9	31.3	0.37%	0.46%
Nebraska	19.9	44.4	0.63%	0.66%
Nevada	25.6	41.1	0.81%	0.61%
New Hampshire	16.5	27.5	0.52%	0.41%
New Jersey	95.9	183.6	3.02%	2.71%
New Mexico	22.7	49.4	0.71%	0.73%
New York	128.3	241.8	4.04%	3.57%
North Carolina	100.8	149.4	3.17%	2.21%
North Dakota	10.3	37	0.32%	0.55%
Ohio	116.5	214	3.67%	3.16%
Oklahoma	45.4	99.1	1.43%	1.46%
Oregon	34.7	63.3	1.09%	0.94%
Pennsylvania	118.4	223.8	3.73%	3.31%
Rhode Island	8.6	14.8	0.27%	0.22%
South Carolina	62.3	92.1	1.96%	1.36%
South Dakota	10.8	22.5	0.34%	0.33%
Tennessee	74.1	127.2	2.33%	1.88%
Texas	293.8	1,280.40	9.25%	18.92%
Utah	25	51.6	0.79%	0.76%
Vermont	7.5	14.6	0.24%	0.22%
Virginia	92.9	153.3	2.92%	2.27%
Washington	62.9	139.2	1.98%	2.06%
West Virginia	19.1	35.1	0.60%	0.52%
Wisconsin	58.6	98.6	1.84%	1.46%
Wyoming	8.5	30.7	0.27%	0.45%
United States	3,177.70	6,767.40	100.00%	100.00%

Source: NFIB Research Foundation calculations based on Energy Information Administration estimates

Over the past three to four years, gasoline prices in Washington have trended closely with gasoline prices for the West Coast as a whole, generally fluctuating between \$3.50 per gallon and \$4.50 per gallon during that time period (**Figure 4**). Gasoline in Washington and on the West Coast tends to sell at a premium to gasoline elsewhere in the United States. During the past two years, this premium has ranged from as low as two cents per gallon to as high as 50 cents per gallon. The spread in September 2014 was approximately 47 cents per gallon. Over the past year, the price of gasoline in Washington has averaged \$3.67 per gallon. *A gas tax of \$0.90 per gallon to \$1.16 per gallon therefore constitutes an increase in the price of gasoline of approximately 24.5 percent to 31.6 percent.*

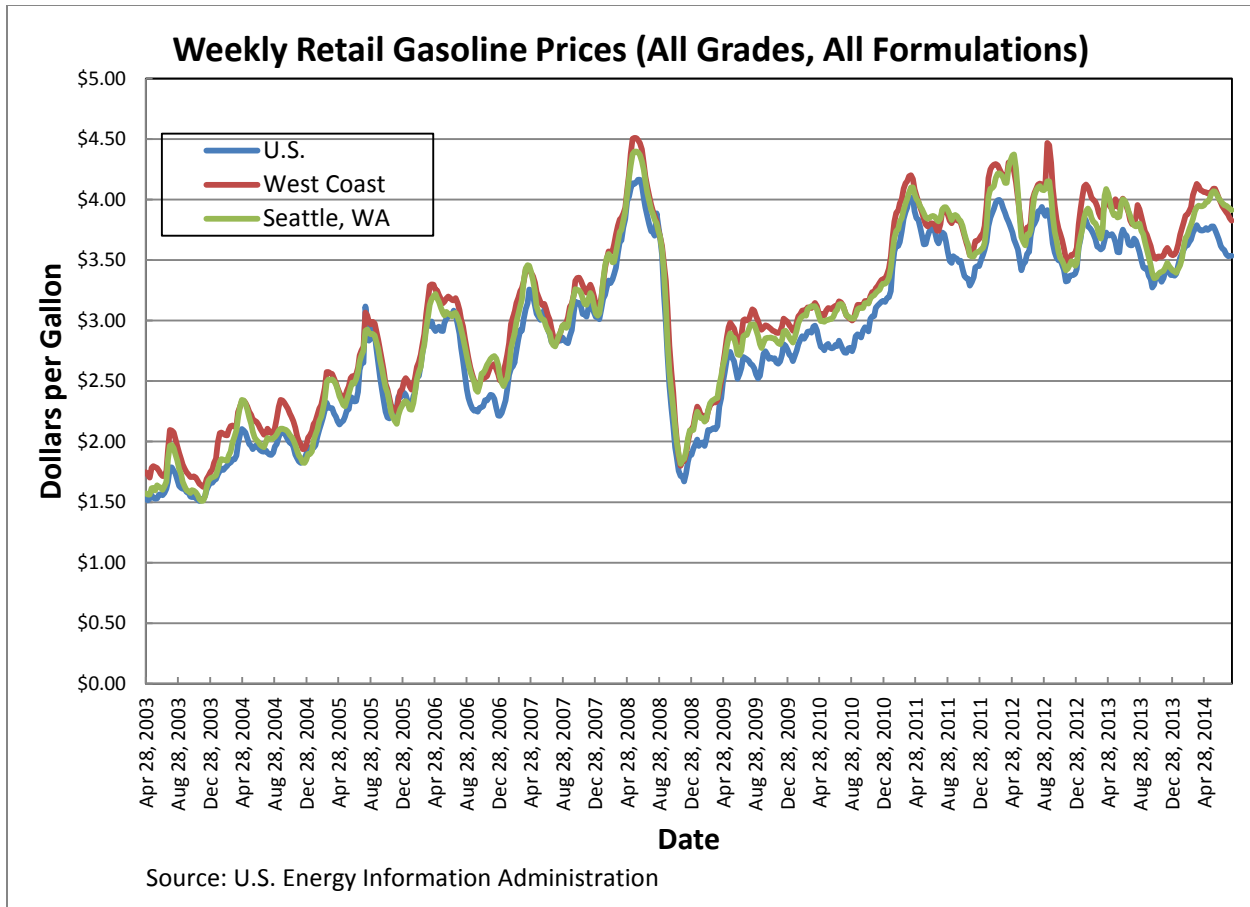


Figure 4

Economic Impact Analysis

Increasing the price of gasoline in Washington by 24.5 percent to 31.6 percent will have a material impact on the spending patterns of energy consumers in the state. All other things equal, businesses will have to pay more in energy costs to produce the same amount of goods and services. Most times, all other things are not equal, and a reasonable expectation is that firms facing substantially higher energy costs may find it in their financial interest to reduce expenditures on other production inputs (primarily labor and capital). At the household level, higher gas prices mean a combination of lower savings and reduced consumption of goods and services. With the national savings rate hovering around five percent and a post-Great-Recession stagnant economy weighing on the minds of Americans, little room exists for households to reduce savings further. A reasonable expectation therefore is that in light of an increase in energy prices, households will somehow trim consumption of (potentially both) energy and non-energy components of the basket of goods they typically purchase.

To estimate the impact a gas tax of such magnitude might have on private sector employment in Washington, the NFIB Research Foundation employed PI+, a leading dynamic, multi-region model based on the Regional Economic Models, Inc. (REMI) structural economic

forecasting and policy analysis model which integrates input-output, computable general equilibrium, econometric, and economic geography methodologies. By comparing simulation results for scenarios which include proposed or yet-to-be-implemented policy changes with the model’s baseline forecast, PI+ is able to obtain estimates of how these policy changes might impact businesses and their workers.

For this analysis, estimates of private sector employment effects for Washington were extrapolated from estimates of national employment effects resulting from simulations of nationwide gas taxes of equal dollar amounts. The estimation process consists of multiplying the national employment effects by Washington’s percent share of total U.S. gasoline consumption (estimated at 1.98% in Table 2).¹¹ The results of the PI+ simulations subsequently adjusted to provide estimates of employment effects for Washington are given in **Table 3**. Estimates are provided not only for the minimum and maximum gas taxes implied by the suggested LCFS, but also for a discrete set of other hypothetical per-gallon gasoline taxes: \$0.05 per gallon, \$0.10 per gallon, \$0.25 per gallon, \$0.50 per gallon, and \$1.00 per gallon. The provision of these latter estimates is intended to give the reader a sense of the substantial disemployment effects that gasoline taxes of even smaller magnitudes will have on the Washington labor market. *Based on the estimation procedure described above, the REMI model forecasts that implementation of a LCFS as described by Governor Inslee could lead to the loss of over 11,000 Washington State jobs during a five-year period.*

Table 3: Estimated Washington State Jobs Lost Due to a Gas Tax (Employee Difference from Baseline*)

Gas Tax (per gallon)	Year				
	2015	2016	2017	2018	2019
\$0.05	530	561	550	509	454
\$0.10	1,053	1,115	1,095	1,013	906
\$0.25	2,587	2,744	2,696	2,494	2,231
\$0.50	5,034	5,345	5,257	4,866	4,359
\$1.00	9,555	10,165	10,014	9,283	8,327
\$0.90	8,687	9,239	9,098	8,432	7,561
\$1.16	10,908	11,612	11,444	10,612	9,524

*The figures in the above table represent the difference in private sector employment from the REMI model’s baseline scenario. For example, the model forecasts that a gas tax of \$1.16 per gallon will result in 11,612 fewer Washington State jobs in 2016 than there otherwise would be, 11,444 fewer Washington State jobs in 2017 than there otherwise would be, etc.

¹¹ Since this analysis concerns the impact of a gasoline tax on employment and not the impact of a tax on all petroleum products, the 1.98% figure is used in lieu of 2.06%.

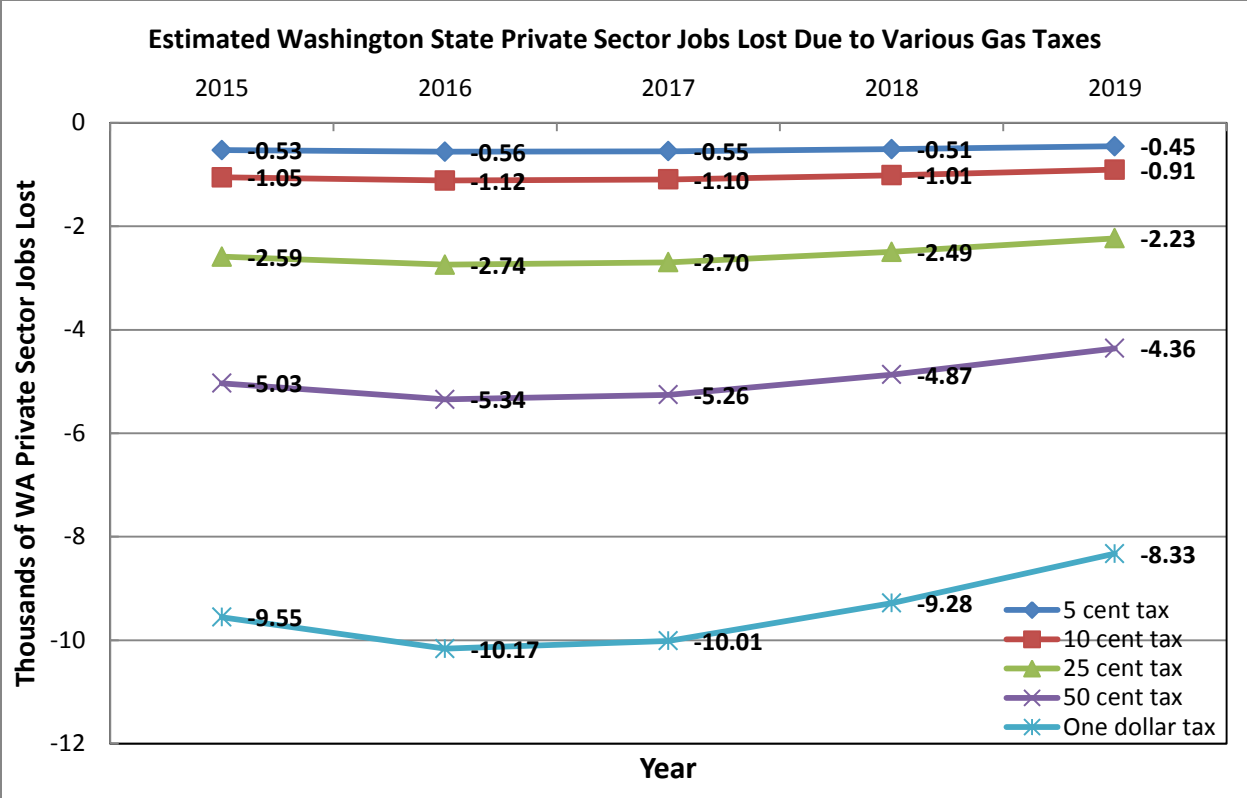


Figure 5

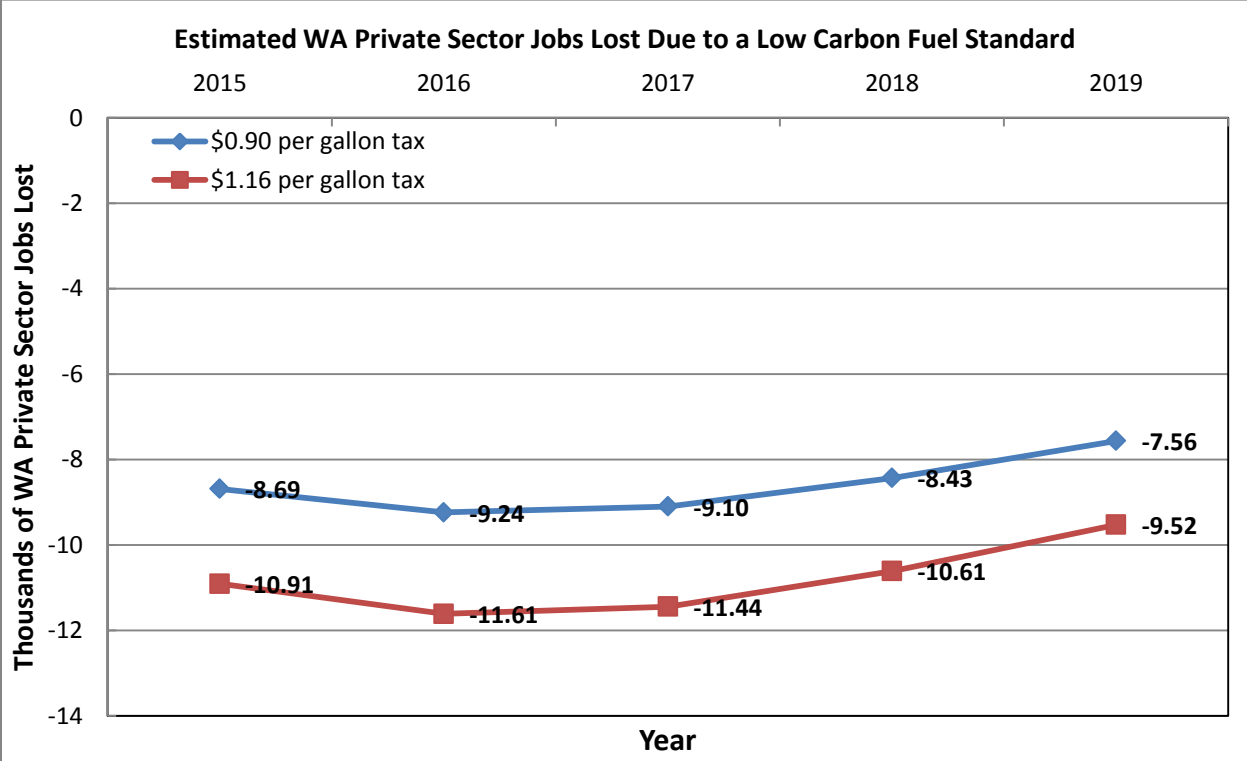


Figure 6

Conclusion

Washington State Governor Jay Inslee recently broached the idea of signing an executive order that would impose lower carbon fuel standards on the state of Washington. A lower carbon fuel standard requires a reduction in the carbon intensity of the transportation fuel mix, on average, over time, considering the entire lifecycle of the fuels. The lifecycle of petroleum-based fuels includes the greenhouse gas emissions associated with crude recovery, crude transportation, fuel production, fuel transportation, and end-use of the fuel in motor vehicles. According to a recent report issued by the Washington State Climate Legislative and Executive Workgroup, the implementation of a LCFS involving a ten percent reduction in the carbon intensity of fuel mix over a 10-year time period in the State of Washington would increase the cost of transportation fuel by \$103 per metric ton of carbon dioxide equivalents (mtCO_{2e}) to \$131 per mtCO_{2e}. Using conversion rates provided by the U.S. Environmental Protection Agency, this range of cost increases is equivalent to increases in the per-gallon cost of gasoline of \$0.90 per gallon to \$1.16 per gallon. *The REMI PI+ model, a leading large-scale econometric forecasting model, estimates that such increases in the cost of energy due to a LCFS could lead to the loss of over 11,000 Washington State jobs during a five-year period.*